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THE NORTH AMERICAN SPECIES OF THE
SUBGENUS *BOTANOPHILA* LIOY,
GENUS *HYLEMYIA* SENS. LAT.
(DIPTERA, MUSCIDÆ)

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The species dealt with in this paper belong to the *varicolor* segregate within the genus *Hylemyia sens. lat.* The group is represented in North America by the following described forms, *Hylemyia varicolor* (Meigen), *H. inornata* Stein, *H. marginata* Stein, *H. spiniventris* Coquillett, *H. setigera* (Johannsen), *H. spinidens* Malloch, *H. marginella* Malloch, *H. piloseta* Malloch, *H. robusta* Stein, *H. brevialpis* Hockett. Two names have been applied to the group, namely *Botanophila* Lioy and *Euryparia* Ringdahl.

The genus *Botanophila* was erected by Lioy (1864)¹ for the reception of the single nominal species *Botanophila varicolor* (Meigen). Coquillett (1910) later designated *Anthomyia varicolor* Meigen as the genotype of Lioy's genus. There would be little need for further comment on the validity of Coquillett's action were it clear that Lioy's species had been correctly named. Unfortunately there has been considerable confusion in the literature concerning the identity of *Anthomyia varicolor* Meigen, and so far as I am aware there has been no attempt to elucidate the nature of the species recorded by Lioy. Collin (1927) has guard-

¹ Figures in parenthesis refer to literature cited in the synonymies according to date of publication.

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edly remarked that *Chortophila varicolor* (Meigen) of Macquart should be considered the type of Lioy's genus. This approach to the problem is made possible on the grounds that Lioy had drawn considerably on the information contained in Macquart's (1835) prior writings for the completion of his own studies, to which Lioy himself had testified. In view of this attempt to clarify the issue it is regrettable to find that there has been little comment in the literature concerning the identity of Macquart's *varicolor*. What information is available has been usually presented by way of synonymy to the effect that Meigen's and Macquart's treatment of *varicolor* may be regarded as indicating the same species. There seem to be no stronger clues that might lead to a different understanding of the matter. I have concluded therefore that the identity of Macquart's species, if it is to survive, should be deduced largely from the information at hand pertaining to the identity of Meigen's *varicolor*.

The species *Anthomyia varicolor* Meigen was, in my opinion, first correctly diagnosed by Villeneuve (1899), when on examining Meigen's types in Paris he pointed out that *Chortophila trapezina* (Zetterstedt) and *C. impudica* Rondani were synonyms of Meigen's species. This observation was supported by Pandellé (1900) and later was more fully substantiated by Schnabl and Dziedzicki (1911). Stein (1916) on monographing the European Anthomyiidae redescribed *varicolor* (Meigen) in greater detail, and helped further to delimit the identity of that species by excluding from consideration Rondani's mistaken concept. Ringdahl (1939) on studying Zetterstedt's collection at Lund cited *Aricia trapezina* Zetterstedt as a synonym of *varicolor* (Meigen). Schiner's² early reference to *varicolor*, like that of Rondani's, may be regarded as an error in identification, as at first sensed by Stein (1900) on examining Meigen's collection in Paris and as later concluded by both Schnabl and Villeneuve.³ Stein (1907) and Séguy (1937) in their catalogues to palearctic and world species of Muscidae have maintained *trapezina* and *varicolor* (Meigen) as distinct species. That Stein in later years may have

² Schiner, J. R. 1862. Die Fliegen (Diptera). Fauna Austriaca. I: 637-638.

³ Schnabl, J. 1911. Dipterologische Sammelreise nach Korsika (Dipt.). Deutsch. Ent. Zeitschr., heft 6, p. 74.

modified his views is indicated by the fact that although *varicolor* was the name employed by Stein (1920) in recording the species from North America yet the specimens on which the record is based were labelled by Stein as *trapezina* Zett. In the light of these considerations relative to the status of Lioy's genus *Botanophila* I have concluded that *Anthomyia varicolor* Meigen may be regarded as available for purposes of type fixation. Thus Coquillett's action to that effect may be accepted as valid.

The monobasic subgenus *Euryparia* was proposed by Ringdahl (1929) for the reception of *Hylemyia varicolor* (Meigen), which species he named as type. I have refrained from applying Ringdahl's subgeneric name to the group in deference to considerations relative to the prior claims of Lioy's generic name *Botanophila*.

The group may be distinguished from allied subgenera on the basis of the following male characters: Prebasal sclerite of hypopygium (tergum 6 of Crampton) bristled along caudal margin (not bare); anal sclerite (tergum 9) roundish, appressed and largely secluded when in repose, weakly bristled; processes of fifth abdominal sternum armed with submarginal spines, which may be strongly or weakly developed; cerci (superior forceps) tapered sharply distad to a stylelike process; gonostyli (inferior forceps) lamellate, furrowed and extensively incised on apical region (except in *fibulans*); outer pair of lobes (gonapophyses) of genitalia much reduced, and each armed with two coarse flagellate setæ. In the male the acrostical bristles are short, fine and slender, except the caudal pair, and in female they are notably weak or absent; the mesopleura are armed with one or more bristlelike setæ on upper border adjacent anterior notopleural bristle; occipital areas immediately below postocular series of setulæ are not bare but possess several setulæ.

The species are predominantly western and northern in distribution, being most abundant in mountainous regions, where herbage, meadows and woodland characterize the terrain. Two of these forms occur commonly in eastern sections from whence they were originally described, namely, *Hylemyia inornata* Stein and *H. setigera* (Johannsen). The species *Hylemyia spinidens* Malloch has also been recorded by Ringdahl (1930) from Eastern Siberia.

EXPLANATION OF KEY TERMS

Width of frons between eyes is measured at narrowest dimension; height of cheek at shortest distance between eye margin and ventral border of cheek when head is viewed in profile. The length of arisal hairs implies the longest; length of proboscis denotes the distal or haustellate portion of that appendage. Processes refer to the copulatory lobes of fifth abdominal sternum in male, and they should be viewed in profile laterally when measured for purposes of comparison. Femoral width signifies the distance from ventral to dorsal surface.

KEYS TO SPECIES

MALES

1. Hind tibia with a robust apical posteroventral bristle 2
 Hind tibia with apical posteroventral bristle lacking or weakly developed, setulose 11
2. Processes armed with a series of robust spines from base to preapical region, tips prolonged into filaments (Figs. 39, 40) 3
 Processes with robust spines restricted to proximal half, those on distal half, if present, are weak, or spines all short, tips not prolonged into filaments (Figs. 36, 42, 44) 4
3. Longest spines on processes exceeding width of hind femur at middle; outer series of bristles confined largely to distal half of process (Figs. 23, 39) *spiniventris* Coq.
 Longest spines on processes not exceeding width of hind femur at middle; outer series of bristles extending to basal region of process (Figs. 33, 40) *subspinata* n. sp.
4. Stronger spines of processes longer or coarser developed than apical setæ on hind metatarsus; processes proportionately broad and stoutish (Figs. 35-38), except in *spinidens* 5
 Stronger spines of processes spinulose and not coarser than apical setæ on hind metatarsus; processes proportionately narrow beyond basal region (Figs. 43, 44) 10
5. Wings yellowish basad *inornata* Stein
 Wings brownish tinged or darker 6
6. Hind tibia with a robust apical posterodorsal bristle; arisal hairs not longer than half width of third antennal segment; antennæ not separated basad by a pronounced facial carina 7
 Hind tibia with a weak apical posterodorsal bristle; arisal hairs longer than half width of third antennal segment; antennæ separated basad by a pronounced facial carina *spinidens* Mall.
7. Cerci divided distad into three denticulate projections (Fig. 9); parafacials at narrowest not as broad as width of third antennal seg-

ment; border of upper calyptra usually richly yellowish.

trifurcata n. sp.

Cerci narrowing distad to a single stylelike process (Figs. 3, 6, 7); parafacials at narrowest slightly wider than breadth of third antennal segment; border of upper calyptra not notably yellowish. 8

8. Cerci angulate in outline cephalad (dorsad), apex sharply formed, (Fig. 7) *acuticauda* n. sp.

Cerci broadly transverse along cephalic (dorsal) margin, (Figs. 3, 6). 9

9. Inner margin of outer digit of gonostyli (inferior forceps) armed with a sharp firm tooth (Fig. 3) *piloseta* Mall.

Inner margin of outer digit of gonostyli with a stumpy short tooth, or only trace of such (Fig. 6) *varicolor* (Meig.)

10. Wings yellowish basad *setigera* (Joh.)
Wings brownish tinged or darker basad *marginella* Mall.

11. Eyes separated by a distance equal to length of third antennal segment; frons and vertex with bristling as in female; interfrontalia uniformly broad throughout *brevipalpis* Huck.

Eyes separated by a distance less than length of third antennal segment; frons and vertex with malelike bristling; interfrontalia narrowed caudad 12

12. Processes armed with a series of robust spines from base to preapical region, tips prolonged into filaments (Figs. 39, 40) 3

Processes with robust spines restricted to proximal half, those distad if present are weak, tips not prolonged noticeably into filaments. 13

13. Wings yellowish basad 14
Wings brownish tinged or darker basad 15

14. Processes proportionately stout with width well maintained on distal half, length about equal to twice average width; spines coarser than setæ at apex of hind metatarsus; hind tibia with apical posterodorsal bristle seldom shorter than apical anteroventral bristle.

inornata Stein

Processes not stout, narrower distad, length nearly three times average width; spines not coarser than setæ at apex of hind metatarsus; hind tibia with apical posterodorsal bristle seldom as long as apical anteroventral bristle *setigera* (Joh.)

15. Antennæ separated by a pronounced facial elevation; vibrissal angle protruded cephalad beyond a level with base of antennæ, axis of head from oral margin to occipital foramen nearly equal to height of head *spinidens* Mall.

Antennæ separated basad by an inconspicuous facial carina 16

16. Arisal hairs not longer than half width of third antennal segment ... 17
Arisal hairs longer than half width of third antennal segment 19

17. Hind tibia with a robust apical posterodorsal bristle; proboscis short, not as long as height of eye; processes stout with width well maintained on distal half, slightly wider than mid femur near apex.

fibulans n. sp.

- Hind tibia with a weak apical posterodorsal bristle; proboscis longer, at least equal in length to height of eye; processes narrower distad, not wider than breadth of mid femur near apex 18
18. Parafacials slightly narrower ventrad, at narrowest not equal to width of third antennal segment; processes with a short series of blackish spines which are more robust than apical setæ on hind metatarsus.

hedleya n. sp.

- Parafacials slightly wider ventrad, at narrowest wider than breadth of third antennal segment; processes armed with spinules which are not coarser than apical setæ on hind metatarsus *marginella* Mall.
19. Eyes separated by a distance not exceeding that between posterior ocelli exclusive, interfrontalia at narrowest not wider than diameter of anterior ocellus; cheeks scarcely as high as length of third antennal segment; vibrissal margin armed with fine slender bristles; proboscis slender; *m-cu* cross vein narrowly sigmoid; processes with a conspicuous fringe of fine hairs on inner margin, which become notably long on distal half and are directed mesad and basad.

marginata Stein

- Eyes separated by a distance slightly greater than that between posterior ocelli exclusive, interfrontalia at narrowest much wider than diameter of anterior ocellus; vibrissal margin armed with coarse stout bristles; proboscis not slender; *m-cu* cross vein broadly sigmoid; cheeks as high as length of third antennal segment 20
20. Process short and stout, about twice as long as average width, clothed with numerous long bristles, many of which are longer than process; apex of veins R_{1+5} and M_{1+2} not divergent at wing margin.

robusta Stein

Processes elongate and narrower distad, about three times as long as average width, armed with few bristles that are longer than process; apex of veins R_{1+5} and M_{1+2} divergent at wing margin.

formiceps n. sp.

FEMALES

1. Hind tibia with a robust apical posteroventral bristle 2
Hind tibia with apical posteroventral bristle weakly developed or setulose 9
2. Hind tibia with a robust apical posterodorsal bristle 3
Hind tibia with apical posterodorsal bristle weaker developed, usually not longer than width of tibia at apex 6
3. Shortest distance from base of oral vibrissæ to eye margin equal to half height of eye; narrowest width of parafacials slightly greater than breadth of third antennal segment; arisal hairs usually not longer than basal diameter of arista *varicolor* (Meig.)
piloseta Mall.
acuticauda n. sp.
- Shortest distance from base of oral vibrissæ to eye margin usually less

than half height of eye; narrowest width of parafacials usually not greater than breadth of third antennal segment 4

4. Proboscis laterally compressed and moderately slender 5
 Proboscis not laterally compressed nor proportionately slender; fore tibia with apical posterodorsal bristle well developed.

fibulans n. sp.

5. Oral margin of face flexed forward rather abruptly, extending slightly cephalad of a vertical line drawn from base of antennæ; veins R_{4+5} and M_{1+2} and $r-m$ cross vein largely brownish; arisal hairs usually not longer than basal diameter of arista *trifurcata* n. sp.

Oral margin not noticeably curved forward, not extending cephalad of a vertical line drawn from base of antennæ; veins R_{4+5} and M_{1+2} and $r-m$ cross vein largely yellowish; arisal hairs usually slightly longer than basal diameter of arista *inornata* Stein

6. Arisal hairs at least as long as half width of third antennal segment, longer than setulæ on first antennal segment; length of proboscis from base of palpi to apex slightly longer than twice length of palpus; oral margin of face curved abruptly cephalad.

subspinata n. sp.

Arisal hairs not as long as half width of third antennal segment; proboscis not longer than twice length of palpus 7

7. Wing membrane extensively yellowish tinged, veins largely yellowish; abdomen densely pale gray or yellowish gray pruinescent 8

Wing membrane not extensively yellowish tinged exclusive of basal region, veins largely brownish; mid femur with one or two bristles on median third of anteroventral surface *marginella* Mall.

8. Cheeks about as high as distance across oral margin; abdomen with no dark dorsocentral streak *setigera* (Joh.)

Cheeks not as high as distance across oral margin; abdomen with a dark dorsocentral streak or stripe *inornata* Stein

9. Arisal hairs not as long as half width of third antennal segment 10

Arisal hairs at least as long as half width of third antennal segment, longer than setulæ of first antennal segment, if about equal facial elevation extensive and broadly separating the respective antennæ from one another, cf. *spinidens* Mall. 13

10. Proboscis compressed laterally, and moderately slender 11

Proboscis moderately short and thickened, not compressed laterally.

fibulans n. sp.

11. Wing membrane and veins extensively yellowish tinged; abdomen densely pale gray or yellowish pruinescent 8

Wing membrane not extensively yellowish tinged exclusive of basal region; veins largely brownish; mid femur with one or two bristles on middle third of anteroventral surface 12

12. Parafacials slightly wider ventrad, at narrowest wider than breadth of third antennal segment; discal area of fifth abdominal tergum devoid of bristlelike setæ laterad; costal thorn robust.

marginella Mall.

Parafacials slightly narrower ventrad, at narrowest not equal to width of third antennal segment; discal area of fifth abdominal tergum with several erect bristlelike setæ laterad; costal thorn not robust.

hedleya n. sp.

13. Proboscis longer than height of head; vibrissal angle prominently projected cephalad; oral margin flexed forward cephalad of apices of antennæ; length of head at greatest diameter exceeding height, interfrontalia at narrowest width scarcely broader than parafrontal at same plane; hairs of arista slightly longer than width of third antennal segment *brevipalpis* Huck.
Not so in all characters 14
14. Proboscis proportionately short and stoutish, not longer than length of face from oral margin to lunule; cheeks fully as high as length of third antennal segment, nearly equal to half height of eye.
formiceps n. sp.
Proboscis moderately slender, longer than height of face; cheeks scarcely as high as length of third antennal segment, shorter than half height of eye 15
15. Facial elevation very pronounced, widely separating antennæ throughout their length; vibrissal angle notably projected, distance from oral margin to eye margin equal to length of second and third antennal segments *spinidens* Mall.
Facial elevation less pronounced, antennæ not widely separated, distance from oral margin to eye margin less than length of second and third antennal segments 16
16. Aristal pubescence featured by alternately arranged long and short hairs, the longest equal to width of third antennal segment; cheeks seldom higher than one third height of eye *marginata* Stein
Aristal pubescence more uniformly developed; longest hairs not equal to width of third antennal segment; cheeks usually slightly higher than one third height of eye *spiniventris* Coq.

Hylemyia (Botanophila) spiniventris (Coquillett)

- Hylemyia spiniventris* Coquillett, 1900, Proc. Wash. Acad. Sci., 2: 449. Aldrich, 1905, Misc. Coll. Smithsn. Inst., 46: 553. Malloch, 1918, Trans. Amer. Ent. Soc., 44: 311. Stein, 1919, Arch. f. Naturgesch., (1917) 83, Abt. A, heft 1, p. 151. Stein, 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 75, 83. Malloch, 1920, Ohio Jour. Sci., 20: 274. Séguy, 1937, Gen. Insect., Fasc. 205, p. 114. Strickland, 1938, Can. Jour. Res., Sect. D, 16: 211.
- Hylemyia spinulamellata* Stein, 1904, Ann. Nat. Hist. Mus. Hungar., 2: 476.

The male of *spiniventris* possesses an extensive series of robust spines along nearly the entire length of processes of fifth abdominal sternum. The tips of many of the spines, when not broken off, terminate in filaments. The arisal hairs in both sexes seem to vary in length within the species, the longer hairs being scarcely to distinctly longer than setulæ on first antennal segment. There is also considerable variation in the degree to which the apical posteroventral bristle of hind tibia may be developed. The species is allied to *marginata* and *subspinata* in habitus.

ALASKA: ♂, ♀, Popoff Island, July 10, 1899 (T. Kincaid), types, ♀, Hurricane, July 11, 1921, 2 ♀ Seward, July 24-25, 1921 (J. M. Aldrich) [U. S. N. M.].

ALBERTA: ♂, Nordegg, July 21, 1926, ♀, Jasper, July 23, 1938, ♀, Waterton, June 19, 1923 (E. H. Strickland) [Univ. Alberta]. ♂, ♀, Lake Louise, Banff, July 27, 1917 [Mus. National d'Hist. Nat.].

BRITISH COLUMBIA: ♂, Hedley, July 4, 1923 (C. B. D. Garrett).

CALIFORNIA: 4 ♂, Mammoth Lakes, July 29, 1940 (R. H. Beamer [Univ. Kansas]. ♂, Tuolumne Meadows, Yosemite Park, July 4, 1927 (J. M. Aldrich) [U. S. N. M.]. 2 ♂, ♀, Siberian Outpost, Tulare County, 9500-10500 ft., July 31, 1915.

COLORADO: 2 ♂, ♀, Tennessee Pass, 10240 ft., July 16-17, 1930, (J. M. Aldrich) [U. S. N. M.]. ♂, Pingree Park, Aug. 16-21, 1925 (C. L. Fluke), 2 ♀, Cuchara, 9000 ft., Aug. 7, 1940 (F. M. Snyder), 2 ♀, Lake City, 8700 ft., Aug. 8-15, 1936 (C. L. Fluke) [F. M. Snyder]. 3 ♂, ♀, Summit, Gore Mts., Toponas, July 10, 1927 (J. C. Bradley) [C. U.]. ♂, Science Lodge, 9500 ft., July 19, 1932 (M. T. James) [Colo. State Coll.]. ♂, Gothie, 9500 ft., July 5, 1934 (C. P. Alexander) [Mass. State Coll.].

IDAHO: ♀, Salmon River, Aug. 25, 1927 (G. Cady) [Univ. Kansas].

MONTANA: ♀, Crazy Mts., 8800 ft., Aug. 8, 1916, 2 ♀, Beaver Creek, 6300 ft., Aug. 1913 (S. J. Hunter), ♀, Bighorn Mts., Aug. 20, 1926 (G. Cady) [Univ. Kansas].

NEW MEXICO: 2 ♂, ♀, Top of Las Vegas Range, June 28, 1902 (Cockerell) [U. S. N. M.]. ♀, Red River, Aug. 14, 1940 (F. M. Snyder).

OREGON: 3 ♂, Aneroid Lake, Blue Mts., 7500 ft., July 23, 1929,

♀, Cornucopia, Lookout Trail, 5900 ft., July 24, 1936, ♀, Anthony Lake, Blue Mts., 7500 ft., July 23, 1929 (H. A. Scullen) [Ore. State Coll.].

UTAH: ♂, Park City to Silver Lake, Sept. 11, 1917 (R. C. Shannon). ♂, Spanish Fork, July 11, 1935. ♀, Tryol Lake, Uintah Mts., ♀, Mirror Lake, Uintah Mts., (D. E. Hardy). ♀, Blue Lake, La Sal Mts., 9500 ft. (V. M. Tanner). ♂, Heber, July 23, 1939 (G. F. Knowlton) [Utah State Coll.].

WASHINGTON: ♀, Mt. Rainier, White River, July 19, 1924 (A. L. Melander).

WYOMING: 18 ♂, 8 ♀, Yellowstone Park, Apollinaris, July 8, 1923, ♂, Yellowstone Park, Indian Creek, July 8, 1923, ♀, Yellowstone Park, 6 mi. So. Thumb, July 17, 1923 (A. L. Melander) [A. L. Melander]. 5 ♂, ♀, Yellowstone Park, Sylvan Pass, Aug. 17, 1927 (J. M. Aldrich) [U. S. N. M.]. ♀, Yellowstone Park, Lower Geyser Basin, ♂, Yellowstone Park, Lewis Lake, (V. M. Tanner). 3 ♂, 2 ♀, Univ. Wyoming Campus, Aug. 15, 1938 (M. T. James) [Colo. State Coll.].

Hylemyia (Botanophila) subspinata new species

MALE, blackish; thorax with three ribbonlike blackish vittæ, more distinct on presutural region; abdomen with broad subtriangular marks and incisures on terga 1 to 4, the fifth largely infuscated; halteres yellowish, calyptræ slightly so, wings blackish basad, and extensively tinged.

Interfrontalia complete to ocellar callosity, broadly so in type; parafacials as wide as breadth of third antennal segment, width well maintained ventrad; cheeks slightly higher than width of parafacials; arisal hairs about as long as half width of third antennal segment, fully as long as setulæ on first antennal segment; proboscis slender, palpi about half as long as proboscis; processes of fifth abdominal sternum with a series of strong spines from basal to preapical region, length of longest not exceeding width of hind femur at middle, outer bristles extending to basal region of processes; copulatory appendages as in Figures 10, 12, 33. Bristling of legs as in *spiniventris*; mid tibia usually with more than one anterodorsal bristle; hind tibia with apical posterodorsal bristle usually weak, apical posteroventral bristle setulose or weakly developed.

FEMALE, paler than male, similar to female of *spiniventris*, from which it differs in possessing less dense pruinescence.

Length 7-8.5 mm.

Holotype and allotype: ♂, ♀, Siberian Outpost, Tulare County, California, 9500-10500 ft., July 31, 1915, [U. S. N. M.]. Para-

types: ♂, same data as holotype. ♂, Mammoth Lakes, California, July 29, 1940 (R. H. Beamer), ♂, ♀, Beaver Creek, Montana, 6300 ft., August, 1913 (S. J. Hunter) [Univ. Kansas]. ♂, Tuolumne Meadows, Yosemite Park, California, July 4, 1927 (J. M. Aldrich) [U. S. N. M.].

The species *subspinata* is closely allied to *spiniventris*, from which it differs in the male by the shorter spines arming the processes, and by the different structure of the copulatory appendages (Figs. 10, 33, 40). In the female the abdomen is less densely pruinose than in *spiniventris*, and apical posteroventral bristle on hind tibia may be stronger developed.

Hylemyia (Botanophila) inornata (Stein)

Hylemyia inornata Stein, 1898, Berl. Ent. Zeitschr., (1897) 42, heft 3 & 4, p. 220. Aldrich, 1905, Misc. Coll. Smithsn. Inst., 46: 552. Stein, 1919, Arch. f. Naturgesch., (1917) 83, Abt. A, heft 1, p. 151. Stein, 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 75. Hockett, 1924, N. Y. (Cornell) Agr. Exp. Sta., Mem. 77 (1923), p. 28. Johnson, 1925, Occ. Pap. Boston Soc. Nat. Hist., 7: 234. Johnson, 1927, Insect Fauna, Biol. Surv. Mt. Desert Region, p. 210. Leonard, 1928, N. Y. (Cornell) Agr. Exp. Sta., Mem. 101, p. 838. Séguy, 1937, Gen. Insect., Fasc. 205, p. 97.

The species *inornata* and *setigera* may invariably be distinguished from others in the group by the brighter yellowish tinge exhibited by the wings. In *inornata* the processes of the male are stouter than those of *setigera*, and the spines are more coarsely developed, conforming in these respects to *varicolor*. In the female of *inornata* the cheeks are usually narrower than in *setigera*, and the abdomen usually has a dark dorsocentral streak, which is lacking in *setigera*. Females of *inornata* differ typically from those of *trifurcata* by the broader interfrontalia and slightly longer aristal hairs.

ALBERTA: ♀, Banff, June 23, 1922 (C. B. D. Garrett) [C. N. C.].

GEORGIA: 2 ♂, Clayton, April 15-22, 1940 (H. C. Hockett).

MARYLAND: ♂, Beltsville, May 28, 1916 (W. L. McAtee).

MASSACHUSETTS: ♂, New Bedford, May 24, 1896 (Hough) type [Chicago Nat. Hist. Mus.].

NEW YORK: 2 ♂, Whiteface Mt., Adirondacks, 3800 ft., July 4, 1921 (J. M. Aldrich) [U. S. N. M.]. ♂, Top Mt. Marcy, Adirondacks, July 13, 1928. ♀, Ithaca, May 28, 1922, ♀, 6-mile Creek, Ithaca, May 27, 1922, ♀, Coy Glen, Ithaca, May 23, 1922, ♂, ♀, Southold, Long Island, June 13, 1926 (H. C. Huckett).

Hylemyia (Botanophila) spinidens (Malloch)

Hylemyia spinilamellata Malloch, 1918, Trans. Amer. Ent. Soc., 44: 312. Frison, 1927, Bull. Ill. Nat. Hist. Surv., 16, Art. 4, p. 203.

Hylemyia nigribasis Stein, p. p., 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 78.

Hylemyia spinidens Malloch, 1920, Trans. Amer. Ent. Soc., 46: 194. Ringdahl, 1930, Ark. Zool., 21A, heft 20, p. 5. Séguy, 1937, Gen. Insect., Fasc. 205, p. 114.

The species *spinidens* is notable on account of the pronounced facial elevation arising between the antennæ, and for the marked protruded development of the vibrissal region. These characters serve to distinguish the species from other forms which by other means are less readily separated. The processes in the male are comparatively narrow in profile, and the spines are grouped basad (Fig. 42). In habitus the species may be associated with *spiniventris* and *marginata*, from which it differs as indicated in keys.

I have seen the Marshall Pass series of specimens deposited in the collections of the Zoological Museum of the University of Berlin, on which Stein based his description of *nigribasis*. In the material were seven males belonging to *spinidens* and six belonging to *marginella*.

ALASKA: 5 ♂, Kodiak, June, 1917, ♂, Snug Harbor, June 8, 1919 (J. S. Hine).

ALBERTA: ♂, 2 ♀, Waterton, July 12, 1923 (H. L. Seamans), ♂, ♀, Banff, July 20, 1922 (C. B. D. Garrett) [C. N. C.]. ♀, Moraine, Aug. 17, 1927 (E. H. Strickland).

BRITISH COLUMBIA: ♂, Lillooet, June 25, 1917 (J. D. Tothill), ♂, Atlin (E. M. Anderson), ♂, Hedley, July 3, 1923 (C. B. D. Garrett), ♂, Glacier, Aug. 21, 1902, ♂, Mt. McLaine, July 12, 1926 (E. R. Buckell), ♂, ♀, Revelstoke Mt., 6000 ft., Aug. 12, 1923 (P. N. Vroom), ♂, Mt. Cheam, Aug. 7, — (Fletcher) [C. N. C.].

5 ♂, London Hill Mine, Bear Lake, 7000 ft., July 21, 1903, 3 ♀, Kokanee Mt., 8000 ft., Aug. 10, 1903 (R. P. Currie), ♀, Kaslo, Aug. 16, — (A. N. Caudell) [U. S. N. M.].

CALIFORNIA: ♂, Bishop, July 28, 1940 (L. J. Lipovsky) [Univ. Kansas]. 4 ♂, Tuolumne Meadows, Yosemite Park, July 4, 1927 (J. M. Aldrich) [U. S. N. M.]. 2 ♂, ♀, Huntington Lake, Fresno County, 7000 ft., July 7, 1919 (E. P. Van Duzee).

COLORADO: 2 ♀, Cameron Pass, 9500 ft., Aug. 18–21, 1940 (G. F. Knowlton), ♂, ♀, Cuchara, 10–12000 ft., Aug. 7–8, 1940 (F. M. Snyder), ♀, Pingree Park, 9000 ft., Aug. 20, 1935 (R. Bushnell) [F. M. Snyder]. ♀, Tennessee Pass, 10240 ft., July 17, 1930 (J. M. Aldrich), ♂, Platte Canyon, near Idlewild, June 10, 1927, 2 ♀, Berthoud Pass, Sept., 1926 (T. D. A. Cockerell) [U. S. N. M.]. ♂, Loch Vale, Rocky Mountain National Park, July 16, 1940 (M. E. Smith), ♀, Red Mt., 11000 ft., July 22, 1934 (C. P. Alexander) [Mass. State Coll.].

IDAHO: ♀, Hoodoo Meadows, Aug. 11, 1938 (W. P. Nye).

MONTANA: ♂, 3 ♀, Gallatin County, 6500 ft., July 15, 1913, ♂, Summit Station, 5200 ft., July 25, — (J. M. Aldrich) [U. S. N. M.]. ♂, Beaver Creek, 6300 ft., Aug., 1913 (S. J. Hunter) [Univ. Kansas].

NEW MEXICO: ♂, Top of Las Vegas Range, June 28, 1902. ♀, Beulah, June 28, 1902, paratype [A. N. S. P.].

NEVADA: 3 ♂, Ormsby County, July 6, — (Baker) [U. S. N. M.].

OREGON: 2 ♂, 3 ♀, Aneroid Lake, Blue Mts., 7500 ft., July 23–24, 1929, ♀, Horseshoe Lake, Blue Mts., 7500 ft., July 26, 1929, 2 ♀, Crater Lake Park, Sun Creek Meadows, 6500–7000 ft., Sept. 3, 1930, ♀, Sparks Lake, Deschutes County, 5428 ft., Aug. 8, 1935, ♂, ♀, Frog Camp to White Bridge Meadow, near McKenzie Pass, 4700–5675 ft., Aug. 6, 1935 (H. A. Scullen) [Ore. State Coll.]. 2 ♂, Lost Lake, Wallowa County, 6000 ft., Aug. 3, 1941, 4 ♂, 2 ♀, Hat Point, Wallowa County, 7000 ft., Aug. 4, 1941 (M. & R. Rieder).

UTAH: ♂, Mt. Logan, June 24, 1938 (G. F. Knowlton, R. E. Nye), ♀, Blacksmith Fork Canyon, Sept. 4, 1938 (W. P. Nye) [Utah State Coll.].

WASHINGTON: ♀, Mt. Baker, Skyline Ridge, Aug. 10, 1925, 2 ♂, ♀, Mt. Rainier, Narada Falls, Aug. 16, 1917, ♂, ♀, Mt. Rainier,

White River, July 20, 1924 (A. L. Melander) [U. S. N. M.]. ♂, Mt. Rainier, Yakima Park, July 25, 1932, ♂, Mt. Rainier, Silver Springs Camp, July 17, 1932 (C. H. & D. Martin), 2 ♂, ♀, Mt. Rainier, Sunrise Trail, 6380 ft., July 27, 1932 (J. & I. Wilcox).

WYOMING: 2 ♂, Yellowstone Park, 4 mi. So. Thumb, July 17, 1923, ♂, Yellowstone Park, Clematis Creek, Aug. 9, 1923, 4 ♀, Yellowstone Park, Apollinaris, Aug. 8, 1923, ♀, Yellowstone Park, Spring Creek, July 15, 1923 (A. L. Melander) [A. L. Melander]. 2 ♂, ♀, Yellowstone Park, Sylvan Pass, Aug. 17, 1927 (J. M. Aldrich) [U. S. N. M.]. ♂, Yellowstone Park, Lake Hotel, 2 ♀, Yellowstone Park, Black Sands Basin, (V. M. Tanner). ♂, Yellowstone National Park, June 28, 1912 (R. C. Osburn).

***Hylemyia (Botanophila) trifurcata* new species**

MALE, blackish; mesonotum with three bandlike stripes and broadly infuscated along declivities, scutellum blackish; abdomen with large subtriangular truncated marks, which successively become larger and less well defined caudad, anterior incisures well formed; chitin at base of processes more or less reddish tinged; wings more or less grayish, more densely so basad; halteres yellow, calyptrae and calyptreal hairs yellowish.

Eyes separated by not more than distance between posterior ocelli, interfrontalia uninterrupted to ocellar callosity, reduced to lineal dimensions caudad; parafacials and cheeks not broadly formed, at narrowest not as wide as breadth of third antennal segment; bristles on parafrontals, cheeks and vibrissal angles slender; aristals hairs not longer than basal diameter of arista; proboscis slender. Processes broad and stout, armed with several longish bristles on the greater part of outer surface, with a submarginal series of shortish coarse spines on proximal half; copulatory appendages as in Figures 9, 30. Legs bristled as in *varicolor*. Cross vein *m-cu* at most slightly sinuate. Length 7 mm.

FEMALE, paler than male, more densely grayish pruinose on thorax and abdomen, markings less distinctly apparent; wings yellowish tinged; *m-cu* cross vein more erect and costal setulae slightly stronger than in male. Length 6 mm.

Holotype and allotype: ♂, ♀, Nahcotta, Washington, May 24, 1917 (A. L. Melander) [U. S. N. M.].

The species *trifurcata* superficially resembles *varicolor*. The males differ essentially in the structure of the cerci and genitalic appendages. In the female of *trifurcata* the parafacials and vibrissal region of the head are usually of smaller proportions than in *varicolor*.

ALBERTA: ♂, Banff, July 20, 1922 (C. B. D. Garrett) [C. N. C.].

CALIFORNIA: ♂, ♀, Humboldt County, May 10, 1911 (Oldenberg).

IDAHO: ♀, Mt. Moscow, summit, July 1, 1932 (J. M. Aldrich) [U. S. N. M.].

OREGON: 2 ♂, Bellfountain, May 27, 1922 (A. L. Lovett). 2 ♂, Waldport, June 7, 1942 (R. E. Rieder). ♂, Detroit, Marion County, May 24, 1942. ♀, 30 mi. W. of Prineville, June 27, 1935 (Joe Schuh) [Ore. State Coll.]. ♂, Eagle Creek, Forest Reserve, July 1, 1917 (A. L. Melander) [A. L. M.].

UTAH: 4 ♂, Salt Lake, 6-7000 ft., June 24, 1922 (A. L. Lovett).

WASHINGTON: ♂, Nahcotta, May 24, 1917 (A. L. Melander) [A. L. M.]. 2 ♂, Mt. Spokane, July 2, 1930 (J. M. Aldrich) [U. S. N. M.]. 2 ♂, Mt. Rainier, Sunrise Trail, 6400 ft., July 29, 1933, ♂, Mt. Rainier, Shadow Lake, 6500 ft., Aug. 15, 1932, ♂, Rainier National Forest, Sawmill Flat, May 31, 1935, ♂, Puyallup, June 4, 1933 (J. Wilcox), ♂, Olympia, May 8, 1935 (W. W. Baker).

Hylemyia (Botanophila) varicolor (Meigen)

Anthomyia varicolor Meigen, 1826, Syst. Besch., 5: 167.

Chortophila varicolor Macquart, 1835, Hist. Nat. d. Ins., Dipt., 2: 325. Villeneuve, 1899, Ann. Soc. Ent. France, 68: 83. Stein, 1900, Ent. Nachr., 26: 156. Pandellé, 1900, Rev. ent. France, 19: 262. Stein, 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 86, 93. Collin, 1927, Ent. Month. Mag. 63: 130.

Aricia trapezina Zetterstedt, 1845, Dipt. Scand., 4: 1513.

Aricia odontogaster Zetterstedt, 1845, Dipt. Scand., 4: 1519.

Anthomyia trapezina Schiner, 1862, Faun. Austr., 1: 638.

Botanophila varicolor Liroy, 1864, Atti Inst. Veneto, 9, ser. 3, p. 990.

Chortophila impudica Rondani, 1866, Atti Soc. Milano, 9: 173.

Rondani, 1877, Dipt. Ital., Prodr., 6: 323. Meade, 1882, Ent. Month. Mag., 19: 146. Meunier, 1893, Bull. Soc. Ent. France, 62, p. LXXV.

Chortophila trapezina Meade, 1882, Ent. Month. Mag., 19: 147.

Meade, 1887, Ent. Month. Mag., 24: 54. Strobl, 1893, Verh.

K. K. zool.-bot. Ges. Wien, 43: 254. Meade, 1897, Descr. List Brit. Anth., 2: 45. Wingate, 1906, Trans. Nat. Hist. Soc. Northumb., 2: 273. Stein, 1907, Kat. Paläark. Dipt., 3: 724.

Hylemyia (Pegohylemyia) varicolor Schnabl and Dziedzicki, 1911, Abh. K. Leop.-Carol. Deutsch. Akad. Naturforsch., 95, Nr. 2, p. 99.

Hylemyia varicolor Stein, 1916, Arch. f. Naturgesch., (1915) 81, Abt. A, heft 10, p. 155. Séguéy, 1925, Encycl. Ent., B. Dipt., 2: 102. Ringdahl, 1928, Trømsø Museums Årshefter, (1926) 49, heft 3, p. 39. Ringdahl, 1939, Opusc. Entomol., 4, heft 3-4, p. 150, 152.

Chortophila (Egeria) varicolor Karl, 1928, Tierwelt Deutschlands, 3, Pt. 13, p. 155.

Hylemyia (Euryparia) varicolor Ringdahl, 1929, Ent. Tidskr., 51: 269. Ringdahl, 1931, K. Svensk. Vetenskapsakad. Skrift Naturskyddsärenden, Nr. 18, p. 19. Tiensuu, 1935, Acta Soc. Faun. Flor. Fenn., 58: 19.

The species *varicolor*, as it occurs in North America, is one of three very closely allied forms, which may be distinguished from one another by differences in the structure of the copulatory appendages as given in the key to males and as illustrated in Figures 6, 15, 25. The females apparently do not possess any marked distinctive characters. Those belonging to *varicolor* have the abdomen more densely brownish yellow pruinose as compared to the darker blackish caste in *piloseta* and *acuticauda*. In addition the wings are paler tinged and the palpi are slightly shorter and less slender. The females of *piloseta* and *acuticauda* are usually more robust, particularly in the bristling of the legs.

Stein (1920) based his record of the species in North America on specimens collected at Juliaetta, Idaho, and on the Sierra Morena Mountains in California. Through the courtesy of Doctor Muesebeck at the United States National Museum I was able to reexamine two males from the Juliaetta series which had been mislaid on the occasion of my study of the Stein collection at Berlin. These specimens, in my opinion, are not conspecific with the male from California, deposited in the Zoological Museums of the University of Berlin. In both cases Stein had written the

name *trapezina* Zett. on labels attached to specimens for purposes of recognition.

ALBERTA: 2 ♂, ♀, Banff, June 21-23, 1922, 2 ♂, same locality, June 26, 1922 (C. B. D. Garrett) [C. N. C.].

BRITISH COLUMBIA: ♂, Okanagan Lake, April 23, 1914 (Tom Wilson).

IDAHO: 2 ♂, Juliaetta, May 3, 1901 (J. M. Aldrich) [U. S. N. M.].

WASHINGTON: ♀, Spanaway, May 9, 1935 (J. Wilcox). ♀, Al-mota, May 20, 1923 (A. L. Melander) [A. L. M.].

Hylemyia (Botanophila) piloseta (Malloch)

Hylemyia piloseta Malloch, 1918, Trans. Amer. Ent. Soc., 44: 313.

Cole and Lovett, 1921, Proc. Cal. Acad. Sci., 11: 312. Frison, 1927, Bull. Ill. Nat. Hist. Surv., 16, Art. 4, p. 202. Séguy, 1937, Gen. Insect., Fasc. 205, p. 107.

The male of *piloseta* possesses a sharp tooth-like process on the inner margin of outer digit of gonostylus (inferior forceps) as illustrated in Figure 3. The drawings of *piloseta* were made from Malloch's paratype deposited in the collections of the Illinois Natural History Survey. The hypopygium had been cleared and preserved in alcohol, and was kindly forwarded by Doctor Ross for purposes of comparative study.

CALIFORNIA: ♂, San Francisco, March 16, 1913 (Bridwell) [U. S. N. M.]. ♂, Del Norte County, May 26, 1910 (Oldenberg). ♀, Marin County, April 4, 1909.

COLORADO: ♂, Tennessee Pass, 10240 ft., July 7, 1930 (J. M. Aldrich) [U. S. N. M.].

OREGON: ♂, Marys Peak, Benton County, June 28, 1942 (R. E. Rieder), ♀, Salem, May 2, 1924 (Ore. Exp. Sta.), ♀, Corvallis, April 18, 1935 (G. Ferguson), ♀, Alsea Mount, May 9, 1931 (J. Wilcox). ♂, Corvallis, April 26, 1908, holotype, ♂, St. Mary's River, no date (Webster), paratype [Ill. Nat. Hist. Surv.].

WYOMING: ♂, ♀, Yellowstone Pass, Clematis Creek, July 8, 1923 (A. L. Melander) [A. L. M.].

Hylemyia (Botanophila) acuticauda new species

MALE, blackish, with whitish gray pruinescence; mesonotum with three blackish vittæ, lateral declivities and scutellum considerably infuscated; proboscis subshining; abdominal terga with well formed, rather narrow sub-

triangular marks, and anterior incisures; wings densely tinged basad, otherwise with little trace of infuscation; halteres yellow, calyptæ slightly yellowish tinged.

Eyes separated by a distance equal to that between posterior ocelli inclusive, interfrontalia uninterrupted to ocellar triangle, broader than parafacial at plane of measurement; cheeks and parafacials usually slightly wider than breadth of third antennal segment; processes of fifth abdominal sternum broad and stout, with short coarse spines stronger developed than apical setæ on hind metatarsus; cerci (superior forceps) extending angularly cephalad (dorsad), apex sharply formed; inner margin of outer digit or extension of gonostylus (inferior forceps) armed with a diminutive bluntish process, Figures 7, 17. Fore tibia with 1 or 2 medial anterodorsal and posteroventral bristles; mid femur with 2 or 3 bristles on proximal half of anteroventral surface, mid tibia with 1 weak medial anteroventral, 2 anterodorsal, 3 posterodorsal and 3 or 4 weaker posterior bristles; hind femur with a series of bristles on entire anteroventral surface and on proximal half of posteroventral surface, those on proximal region more robust and less curved than those on distal region, hind tibia with 3 anteroventral and 4 or more bristles on anterodorsal and on posterodorsal surfaces, with a few setulæ on proximal half of posteroventral surface, apical posterodorsal and posteroventral bristles robust.

FEMALE, paler than male, thorax more densely cinereous pruinose, markings less distinct and largely restricted to a brownish median stripe; abdomen subshining with silky grayish pruinoscence; wings yellowish or light brownish tinged. Legs bristled as in male; mid femur with 3 or more strongish bristles on anteroventral surface; hind femur with bristles less robust than in male, hind tibia devoid of posteroventral setulæ.

Length 7-8 mm.

Holotype and allotype: ♂, ♀, Rainier National Forest, Sawmill Flat, Washington, May 26, 1935 (J. Wilcox) [U. S. N. M.].

The males of *acuticauda* may be distinguished from associated forms by the angular extension of the cerci cephalad (dorsad), and in addition the gonostylus (inferior forceps) lacks the sharp tooth-like process on inner margin of outer digit exhibited by *piloseta*, Figure 3. These differences though small and seemingly inconsequential for diagnostic purposes have been found to be surprisingly constant in twenty-four males of the *varicolor* complex that have been examined.*

ALBERTA: ♂, ♀, Waterton, June 19, 1923 (E. H. Strickland) [Univ. Alberta].

* I am deeply indebted to Dr. C. H. Curran for preparing these specimens for study of the terminal appendages of the hypopygium.

BRITISH COLUMBIA: ♂, Lillooet, June 23, 1917 (J. D. Tothill), 2 ♀, Chilcotin, June 18, 1920, ♀, Vernon, May 20, 1925 (E. R. Buckell), 2 ♀, Hedley, 7000 ft., July 23, 1923 (C. B. D. Garrett) [C. N. C.].

CALIFORNIA: ♂, Fallen Leaf Lake, June 21, 1915 (A. K. Fisher), 3 ♂, Tuolumne Meadows, Yosemite Park, July 4-5, 1927 (J. M. Aldrich) [U. S. N. M.].

COLORADO: 2 ♂, 4 ♀, Grand Mesa, July 7-8, 1938 (U. Lanham) [Univ. Colo. Mus.]. ♂, Steamboat Springs, May 27, — (Cockerell), ♀, Pingree Park, Aug. 20, 1923 (A. L. Lovett), ♀, Elk Creek, Fraser, Grand County, July 7-9, 1927 (J. C. Bradley), 2 ♀, Tennessee Pass, July 24-26, 1917 (J. M. Aldrich) [U. S. N. M.].

MONTANA: ♀, Gallatin County, 6800 ft., June 27, 1900 (R. Cooley), ♀, Florence, June 1, 1912 (Mont. Exp. Sta.).

NEW MEXICO: ♂, Jemez Springs, June, 1928 (J. Woodgate). ♂, Jemez Mts., June 28, 1874.

OREGON: ♀, The Dalles, April 30, 1938, 2 ♀, Mosier, May 5, 1938 (K. Gray, J. Schuh), ♀, Meacham, 3680 ft., May 8, 1927, ♀, Aneroid Lake, Blue Mts., 7500 ft., July 23, 1929 (H. A. Scullen) [Ore. State Coll.].

SASKATCHEWAN: ♀ Cypress Hills, near Maple Creek, June 26, 1926 (C. R. Young) [C. N. C.].

UTAH: ♀, Glendale, July 13, 1938 (G. F. Knowlton, F. C. Harmston).

WASHINGTON: 4 ♀, Rainier National Forest, Sawmill Flat, June 26, 1935 (J. Wilcox).

WYOMING: ♂, Yellowstone Park, 6 mi. So. Thumb, July 17, 1923, 2 ♀, Yellowstone Park, Thumb Sta., July 16, 1923 (A. L. Melander) [A. L. M.].

Hylemyia (Botanophila) setigera (Johannsen)

Hammomyia setigera Johannsen, 1916, Trans. Amer. Ent. Soc., 42: 387.

Hylephila setigera Johnson, 1925, Occ. Pap. Boston Soc. Nat. Hist., 7: 236.

Hylemyia setigera Hockett, 1924, N. Y. (Cornell) Agr. Exp. Sta., Mem. 77 (1923), p. 32. Leonard, 1928, N. Y. (Cornell) Agr.

Exp. Sta., Mem. 101 (1926), p. 839. Séguy, 1937, Gen. Insect., Fasc. 205, p. 113. Strickland, 1938, Can. Jour. Res., 16, Sect. D, p. 211. Brimley, 1938, Ins. North Carol., p. 376.

The species *setigera* and *marginella* are structurally closely allied. They differ superficially in that the wings of *setigera* are decidedly more yellowish tinged and the abdomen has paler marks than in *marginella*. The female of *setigera* may be confused with that of *inornata*, from which it differs structurally in the wider development of the cheeks.

ALBERTA: ♀, Bearberry Creek, near Sundre, July 23, 1926 (C. H. Young), ♀, Mtn. Vieu, June 20, 1923 (H. L. Seamans) [C. N. C.]. ♀, St. Paul, June 22, 1938, ♀, Gull Lake, June 14, 1929 (E. H. Strickland) [Univ. Alberta].

CONNECTICUT: ♂, Redding, May 31, 1931 (A. L. Melander) [A. L. M.].

MASSACHUSETTS: ♂, N. Amherst, May 30, 1922.

MICHIGAN: ♂, Lake County, June 8, 1940 (R. R. Dreisbach), ♀, Cusino, June 26-27, 1940 (T. F. Boyce).

MONTANA: ♀, Bozeman, 4800 ft., June 30, 1900 (E. Koch).

NEW HAMPSHIRE: ♀, Franconia (A. T. Slosson).

NEW YORK: ♂, Laborador Lake, Cortland County, June 9, 1921, ♂, Lake Charlotte, June 26, 1920, ♀, Herkimer, Aug. 8, 1921 (M. D. Leonard). ♂, Rock City, Cattaraugus County, June 9, 1915. ♂, Ithaca, May 23, 1936 (H. C. Hallock). 3 ♂, ♀, Taughannic, near Ithaca, May 8, 1921, ♀, Harman, May 7, 1926, ♂, Valley Stream, Long Island, April 27, 1921, 2 ♀, Lakeville, Long Island, May 22, 1921, ♂, Glen Head, Long Island, May 19, 1921, 2 ♂, 2 ♀, Hicksville, Long Island, June 3-12, 1944 (H. C. Hockett).

ONTARIO: ♂, Burke Falls, July 12, 1926 (F. P. Ide) [C. N. C.].

QUEBEC: ♂, Maniwaki, June 28, 1925 (C. H. Curran).

SASKATCHEWAN: ♂, Farewell Creek, S. Sask., July [C. N. C.].

SOUTH DAKOTA: 5 ♀, Custer, July 17, 1924.

WYOMING: ♂, near Lander, 5000-8000 ft., June (R. Moodie).

***Hylemyia (Botanophila) fibulans* new species**

MALE, blackish; cheeks and parafacials densely pruinose; thorax with trace of three vittæ and fuscous markings along lateral declivities of mesonotum; abdomen lightly grayish pruinose, with large subtriangular marks and dark incisures along cephalic margin of terga; wings brownish tinged, deeply so basad; calyptræ yellowish tinged, halteres yellow.

Eyes separated by about distance between posterior ocelli; parafacials at narrowest about equal to width of third antennal segment; cheeks higher than maximum width of parafacials at base of antennæ, broadly maintained caudad, vibrissal angle not prominently developed; hairs of arista not longer than setulæ on first antennal segment; proboscis not flattish laterally, scarcely longer than length of eye at greatest diameter; processes of fifth abdominal sternum proportionately broad and large, with weak bristling except apicad, stronger spines stouter than setæ at apex of hind metatarsus, inner margin fringed with a series of minute spinules; cerci and gonostyli slender, the latter stylelike in form and not incised on apical region (Fig. 4). Mid femur with weak inconspicuous bristles on anteroventral surface; mid tibia with 1 anterodorsal, 2 posterodorsal and 2 posteroventral bristles; hind femoral bristles not notably strong, extending along entire length of anteroventral surface and on proximal two-thirds of posteroventral surface; hind tibia with 3 anteroventral, 4 anterodorsal, 4 posterodorsal bristles, and with 2 or 3 setulæ on proximal half of posteroventral surface, apical posterodorsal about as long as apical mid dorsal bristle and apical posteroventral bristle weak or lacking.

FEMALE, paler than male, more densely grayish pruinulent, thorax opaque, abdomen decidedly subshining with silky sheen, markings indefinite or absent; wings yellowish brown tinged. Fore tibia with a robust apical posterodorsal bristle, mid femur devoid of bristles on anteroventral surface, mid tibia with an anteroventral, 1 or 2 anterodorsal, 2 posterodorsal, and 2 or 3 weaker bristles on posterior and posteroventral surfaces; hind legs bristled as in male except that the posteroventral surface of hind tibia is devoid of setulæ and the apical posteroventral bristle may be well developed.

Length 9–10 mm.

Holotype: ♂, Mt. Moscow, Idaho, June 10, 1930 (J. M. Aldrich).
Allotype: ♀, Marys Peak, Benton County, Oregon, June 28, 1942 (R. E. Rieder) [U. S. N. M.].

The species *fibulans* unlike the majority of forms belonging to the group has the proboscis shorter and laterally less flattened. In the male the gonostyli are peculiar in their simple style-like and unincised character: likewise the cerci are reduced to slender proportions for the greater part of their length (Fig. 4). The arisal hairs are only slightly longer than basal diameter of arista, as in *inornata* and *setigera*, but from both of these forms the male of *fibulans* may be readily separated by the brownish tinge of the wings. In the female this character is not so useful for separating the species.

ALBERTA: ♂, Banff, June 30, 1917 [C. N. C.].

IDAHO: ♂, Mts. Moscow, July 10, — (R. C. Shannon).

OREGON: 2 ♂, Aneroid Lake, Blue Mts., 7500 ft., July 23, 1929 (H. A. Scullen). ♀, Marys Peak, Benton County, June 28, 1942, ♀, Silver Creek Falls, Marion County, June 7, 1940 (R. E. Rieder) [Ore. State Coll.].

WYOMING: ♂, ♀, Yellowstone Park, Spring Creek, July 15, 1923 (A. L. Melander) [A. L. M.].

***Hylemyia (Botanophila) hedleya* new species**

MALE, blackish, lightly grayish pruinosecent; thorax with trace of vittæ; abdomen with broad subtriangular marks and anterior incisures; wings brownish tinged, blackish basad.

Eyes separated by a distance equal to that between posterior ocelli exclusive, interfrontalia complete to ocellar triangle, reduced to lineal dimensions caudad; parafacials and cheeks at narrowest scarcely as wide as third antennal segment; arista with hairs not as long as setulæ on first antennal segment; proboscis slender. Mid femur with a series of weak short bristles on proximal half of anteroventral surface; mid tibia with 1 anterodorsal, 2 posterodorsal and 2 posteroventral bristles, none of which are robust; hind femur with a full series of anteroventral bristles, the stronger of which are situated on distal half, and with 2 or 3 diverse slender posteroventral bristles; hind tibia with 2 or 3 anteroventral, 4 anterodorsal and 4 or 5 posterodorsal bristles, with 2 or 3 posteroventral setulæ, apical posterodorsal and posteroventral bristles weak. Processes of fifth abdominal sternum narrow, and with weak slender bristles on outer surface, armed with a single series of 3 or 4 spines on proximal half, the stronger of which are longer than apical setæ on hind metatarsus, inner margin of processes fringed with short hairs; wings with *m-cu* cross vein straight.

FEMALE, more densely grayish pruinosecent than male; abdomen with silky pruinosecence, subshining, markings indistinct; tergum 5 with several erect slender bristles laterad on discal surface; mid femur with 1 or 2 bristles on basal third of anteroventral surface, mid tibia with a medial anteroventral bristle; hind tibia devoid of setulæ on posteroventral surface, otherwise bristling of legs as in male; wings yellowish brown tinged, and with weak costal thorns.

Length 7-8 mm.

Holotype: ♂, Hedley, British Columbia, July 20, 1923 (C. B. D. Garrett). Allotype: ♀, Waterton, Alberta, June 19, 1939 (E. H. Strickland) [C. N. C.].

The species *hedleya* runs down with *marginella* in both keys on the strength of the short haired arista and absence of a robust bristle at apex of posterodorsal and posteroventral surfaces of hind tibia. The male of *hedleya* possesses stronger spines on

processes, and in both sexes the parafacials and cheeks are not so broadly formed as in *marginella*.

Hylemyia (Botanophila) marginella (Malloch)

- Hylemyia marginella* Malloch, 1918, Trans. Amer. Ent. Soc., 44: 311. Frison, 1927, Bull. Ill. Nat. Hist. Surv., 16, Art. 4, p. 202. Séguy, 1937, Gen. Insect., Fasc. 205, p. 102.
- Hylemyia nigribasis* Stein, p. p., 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 78.

The males of *marginella* may be distinguished from those of *varicolor* and related forms by the narrower proportions of the processes of fifth abdominal sternum and by the much weaker spines (Fig. 44). In these respects *marginella* agrees with *setigera*, but from the latter *marginella* may be distinguished by the darker brownish tinge exhibited by the wings. The females of *marginella* may invariably be separated from those of *varicolor* and related forms by the weaker developed apical posterodorsal bristle on hind tibia, a character that I find is not quite so dependable for purposes of distinction among males.

ALBERTA: ♂, Vermilion, June 23, 1938, ♂, Edmonton, July 13, 1929 (E. H. Strickland).

BRITISH COLUMBIA: ♂, Lillooet, June 25, 1917 (J. D. Tothill) [C. N. C.].

COLORADO: ♂, Tennessee Pass, July 24, 1917 (J. M. Aldrich) type [Ill. Nat. Hist. Surv.]. ♂, Marshall Pass, July 28, 1908 (J. M. Aldrich) [U. S. N. M.]. ♂, Cuchara, 12000 ft., Aug. 8, 1940 (F. M. Snyder), ♂, 3 ♀, Lake City, 9000 ft., Aug. 8-21, 1938 (C. L. Fluke), ♂, 4 ♀, Pingree Park, Aug. 15, 1932 [F. M. Snyder]. ♀, Ward, Aug. 14, 1939 (M. T. James) [Colo. State Coll.]. ♂, Spring Creek, Pass, June 29, 1937 (C. L. Johnston), 3 ♂, Slumgullion Pass, June 29, 1937 (R. H. Beamer) [Univ. Kansas]. ♂, Grant, Geneva Park, 10000 ft., Aug. 16, 1914 (E. C. Jackson).

MONTANA: ♀, Summit Station, 5200 ft., July 25, — (J. M. Aldrich) [U. S. N. M.].

NEW MEXICO: 2 ♂, Top of Las Vegas Range, Beulah, June 28, 1902, paratypes [A. N. S. P. & Ill. Nat. Hist. Surv.].

OREGON: ♂, Breitenbush Lake, Marion County, June 23, 1940

(R. E. Rieder), ♀, Lost Lake, Wallowa County, 6000 ft., Aug. 6, 1941 (M. & R. E. Rieder), ♂, Izee, Keerin's Ranch, June 25, 1935 (Joe Schuh), ♀, Strawberry Lake, Grant County, 6400 ft., July 17, 1936, ♀, Cornucopia, 7250 ft., July 24, 1936, ♀, Kelsey Valley G. Sta., Douglas County, 4100 ft., Aug. 17, 1935 (H. A. Scullen) [Ore. State Coll.].

WASHINGTON: ♀, Calfax (J. M. Aldrich) [U. S. N. M.]. ♂, Mt. Rainier, Paradise Park, Aug. 1917 (A. L. Melander) [A. L. M.]. 2 ♀, Mt. Rainier, Paradise Inn, July 20, 1930.

WYOMING: ♂, ♀, Yellowstone Park, Apollinaris, Aug. 8, 1923, ♂, Yellowstone Park, Clematis Creek, July 9, 1923, 2 ♀, Yellowstone Park, Spring Creek, July 15, 1923 (A. L. Melander) [A. L. M.].

Hylemyia (Botanophila) brevipalpis (Huckett)

Hylemyia brevipalpis Huckett, 1929, Can. Ent., 61: 180. Séguy, 1937, Gen. Insect., Fasc. 205, p. 80. Strickland, 1938, Can. Jour. Res., 16, Sect. D, p. 210.

The male of *brevipalpis* may be readily distinguished from all others in the group by the broad female-like frons. In both sexes the head is longer than high owing to the protuberance of the vibrissal angle and oral margin. The longest arisal hairs are equal to width of third antennal segment.

ALBERTA: 2 ♀, Waterton, Aug. 18, 1939 (E. H. Strickland) [Univ. Alberta].

BRITISH COLUMBIA: ♀, Mt. Cheam, Aug. 6, 1903.

WYOMING: ♂, ♀, Sylvan Pass, Yellowstone Pass, Aug. 17, 1927 (J. M. Aldrich) [U. S. N. M.].

Hylemyia (Botanophila) marginata (Stein)

Hylemyia marginata Stein, 1898, Berl. Ent. Zeitschr., (1897) 42, heft 3-4, p. 221. Coquillett, 1900, Proc. Wash. Acad. Sci., 2: 448. Aldrich, 1905, Misc. Coll. Smithsn. Inst., 46: 553. Stein, 1919, Arch. f. Naturgesch., (1917) 83, Abt. A, heft 1, p. 151. Stein, 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 76. Malloch, 1920, Ohio Jour. Sci., 20: 274. Séguy, 1937, Gen. Insect., Fasc. 205, p. 102. Strickland 1938, Can. Jour. Res., 16, Sect. D, p. 211.

The species *marginata* comes closest to *spiniventris* in habitus. In the male of *marginata* the processes of fifth abdominal sternum are comparatively narrow in profile when viewed laterally, and are armed for much of their length with a series of spines, the tips of many of which tend to become filamentous (Fig. 41). The inner margin of processes has a prominent series of fine longish hairs which are at least as long as the spines; those distad are directed slightly basad. The bristles along the cheeks and vibrissal margin are more slender than in many related forms. In both sexes of *marginata* the pubescence of the arista is featured by a rough series of alternately arranged long and short hairs, the longer ones being equal to width of third antennal segment.

ALBERTA: ♂, Jasper, July 21, 1938, ♂, Moraine, Aug. 17, 1927 (E. H. Strickland). ♂, Lake Louise, Banff, July 27, 1917. ♀, Waterton, July 17, 1923 (H. L. Seamans).

BRITISH COLUMBIA: ♂, Hedley, Aug. 29, 1923 (C. B. D. Garrett) [C. N. C.].

CALIFORNIA: ♂, 3 ♀, Santa Cruz Mts., Santa Cruz, June 8, 1940 (M. T. James) [Colo. State Coll.]. 2 ♂, Lone Pine, July 28, 1940 (D. E. Hardy), 2 ♂, Bishop, July 28, 1940 (L. J. Lipovsky) [Univ. Kansas].

COLORADO: 3 ♂, ♀, No. 1582, no data (Hough), cotypes [Chi. Nat. Hist. Mus.]. ♂, No. 1581, no data, cotype [Z. M. U. B.]. ♂, Marshall Pass, July 28, 1908 [Z. M. U. B.]. ♀, Cameron Pass, 10285 ft., Aug. 21, 1940 (G. F. Knowlton) [Utah State Coll.]. ♀, Berthould Pass, Aug. 22, 1936 (C. W. Sabrosky) [Mich. State Coll.]. ♀, Lake City, 8700 ft., Aug. 8-15, 1936 (C. L. Fluke) [F. M. Snyder]. ♂, ♀, Red Mt., 11000 ft., July 22, 1934 (C. P. Alexander) [Mass. State Coll.].

IDAHO: ♂, ♀, Moscow Mt., July 4-8, 1911 (M. A. Yothers), ♂, Lake Waha, July 22, 1927 (J. M. Aldrich) [U. S. N. M.].

MONTANA: ♂, Glacier Park Station, 4800 ft., July 24, —, (J. M. Aldrich), ♀, Gallatin County, 6500 ft., July 15, 1913 [U. S. N. M.].

OREGON: ♂, Aneroid Lake, 7500 ft., Aug. 1, 1941 (M. & R. E. Rieder).

UTAH: ♀, Card Canyon, Logan Canyon, July 24, 1938 (W. P. Nye).

WASHINGTON: ♂, Naches, July 7, 1935 (R. H. Beamer) [Univ.

Kansas]. ♂, Mt. Rainier, Summerland, July 24, 1924, ♂, Mt. Rainier, Glacier Sta., Aug. 15, 1917, ♂, Mt. Rainier, Yakima Trail, July 22, 1924, ♀, Mt. Rainier, Van Trump Creek, Sept. 1, 1917 (A. L. Melander) [A. L. M.].

WYOMING: ♂, Yellowstone Park, Larva Creek, July 5, 1923 (A. L. Melander) [A. L. M.]. ♂, Sylvan Park, Yellowstone Park, Aug. 17, 1927 (J. M. Aldrich) [U. S. N. M.]. ♀, Dunraven Pass, Aug. 31, 1924 (N. Criddle) [C. N. C.]

Hylemyia (Botanophila) robusta (Stein)

Hylemyia robusta Stein, 1920, Arch. f. Naturgesch., (1918) 84, Abt. A, heft 9, p. 76.

The name *robusta* was included by Stein in his key to *Hylemyia* published in the paper cited above, but the species was not further described. In studying Stein's North American material deposited at the Zoological Museum of the University of Berlin in 1932 I came across two males placed under the name *robusta* Stein which evidently was the material used by Stein in preparing his key. One male possessed the locality label, "Moore's Lake, Idaho, July 10, 1907," the other male specimen, "Moscow Mt., Idaho, June 3, 1911." I have seen a third male specimen, which I regard as conspecific, bearing the label, "Glenwood, Washington, May 6, 1923 (A. L. Melander)."

The species, as the name implies, is notable for the robust form of the thorax and abdomen, both of which are stouter than in other species belonging to the group. The eyes possess a few hairs and are separated by a distance about equal to that between posterior ocelli; the interfrontalia is uninterrupted caudad. Arisital hairs are slightly longer than half width of third antennal segment; cheeks are fully as wide as parafacials; proboscis not longer than height of eye. The thorax is trivittate, and abdominal marks broadly subtriangular. Processes of fifth abdominal sternum are armed with a series of spines on proximal half, the latter are about half as long as width of processes where situated, when the processes are viewed laterally in profile. The sternopleural bristles are arranged 2:2. The ninth tergum of abdomen (anal sclerite) has numerous curling bristles. The wings are slightly tinged, denser so basad; *m-cu* cross vein is oblique and

notably sinuate. Fore tibia has a setulose apical posterodorsal and posteroventral bristle; mid femur has a series of weak anteroventral bristles, mid tibia with 2 anterodorsal, 2 posterodorsal and 2 posterior bristles; hind femur has a series of 7 to 9 anteroventral and 5 or 6 posteroventral bristles, of which the stronger are situated on median third; hind tibia has 5 anteroventral, 4 to 6 anterodorsal, 4 or 5 posterodorsal bristles, 4 or 5 posterior setulæ, apical posterodorsal bristle weak, and apical posteroventral setulose. Length 10 mm.

Hylemyia (Botanophila) formiceps new species

MALE, blackish; thorax subshining, with traces of vittæ; abdomen with dense grayish pruinescence and with well marked subtriangular marks and anterior incisures; wings infuscated, densely so basad.

Eyes separated by a distance equal to that between posterior ocelli inclusive; interfrontalia complete, broadly ribbonlike caudad; parafacials and cheeks broadly developed, the former wider at narrowest than breadth of third antennal segment, the latter is as high as length of third antennal segment; ventral border of cheeks with numerous longish bristles; arisal hairs nearly as long as width of third antennal segment; proboscis not long and slender. Processes of fifth abdominal sternum narrow, armed with a series of 5 or 6 spines on proximal half, the stronger being about equal to or slightly longer than apical setæ on hind metatarsus. Wings with *m-cu* cross vein oblique and sinuate; apex of veins R_{4+5} and M_{1+2} slightly divergent at wing margin. Mid femur with a series of weak short bristles on proximal half of anteroventral surface; mid tibia with one anterodorsal, 2 posterodorsal and 2 posterior bristles; hind femur with a full row of robust anteroventral bristles, the stronger extending to proximal region, and with several bristles on proximal two-thirds of posteroventral surface; hind tibia with 3 or 4 anteroventral, 4 or 5 anterodorsal, 3 or 4 posterodorsal bristles, and with 2 or 3 setulæ on proximal half of posteroventral surface, apical posterodorsal bristle weak, and apical posteroventral lacking.

FEMALE, paler than male; thorax and abdomen densely grayish pruinescent, parafacials and cheeks very broadly developed, as wide as length of third antennal segment; wings yellowish brown tinged. Mid tibia with one anteroventral, 2 anterodorsal, 2 posterodorsal and 2 weaker posteroventral bristles; hind tibia with 2 anteroventral, 4 anterodorsal, 4 posterodorsal bristles, setulæ on posteroventral surface lacking, apical posterodorsal bristle weak, apical posteroventral not developed; *m-cu* cross vein straighter and costal thorn more robust than in male.

Length 9–10 mm.

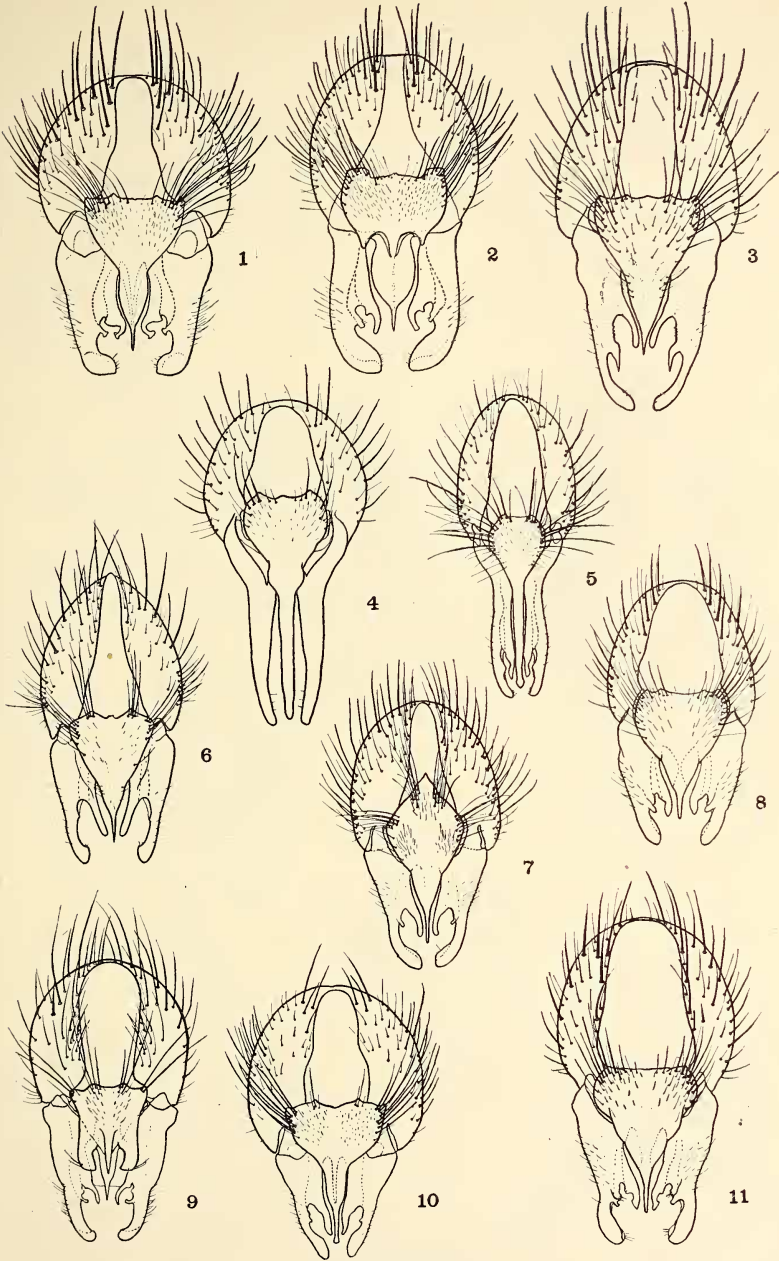
Holotype: ♂, Mt. Home Canyon, California, September 20, 1922. Allotype: ♀, same locality, September 22, 1923 (F. R. Cole) [U. S. N. M.].

The species *formiceps* may be distinguished from related forms having longish hairs on arista by the broadly formed parafacials and cheeks. In certain respects the species resembles *robusta*, the male of which is only known to me and from which *formiceps* may be distinguished by the more slender proportions of processes.

PLATE I

Dorsal or caudal aspect of male copulatory appendages

- Figure 1. *H. (Botanophila) spiniventris* (Coquillett).
- Figure 2. *H. (Botanophila) marginata* (Stein).
- Figure 3. *H. (Botanophila) piloseta* (Malloch).
- Figure 4. *H. (Botanophila) fibulans* new species.
- Figure 5. *H. (Botanophila) spinidens* (Malloch).
- Figure 6. *H. (Botanophila) varicolor* (Meigen).
- Figure 7. *H. (Botanophila) acuticauda* new species.
- Figure 8. *H. (Botanophila) marginella* (Malloch).
- Figure 9. *H. (Botanophila) trifurcata* new species.
- Figure 10. *H. (Botanophila) subspinata* new species.
- Figure 11. *H. (Botanophila) setigera* (Johannsen).

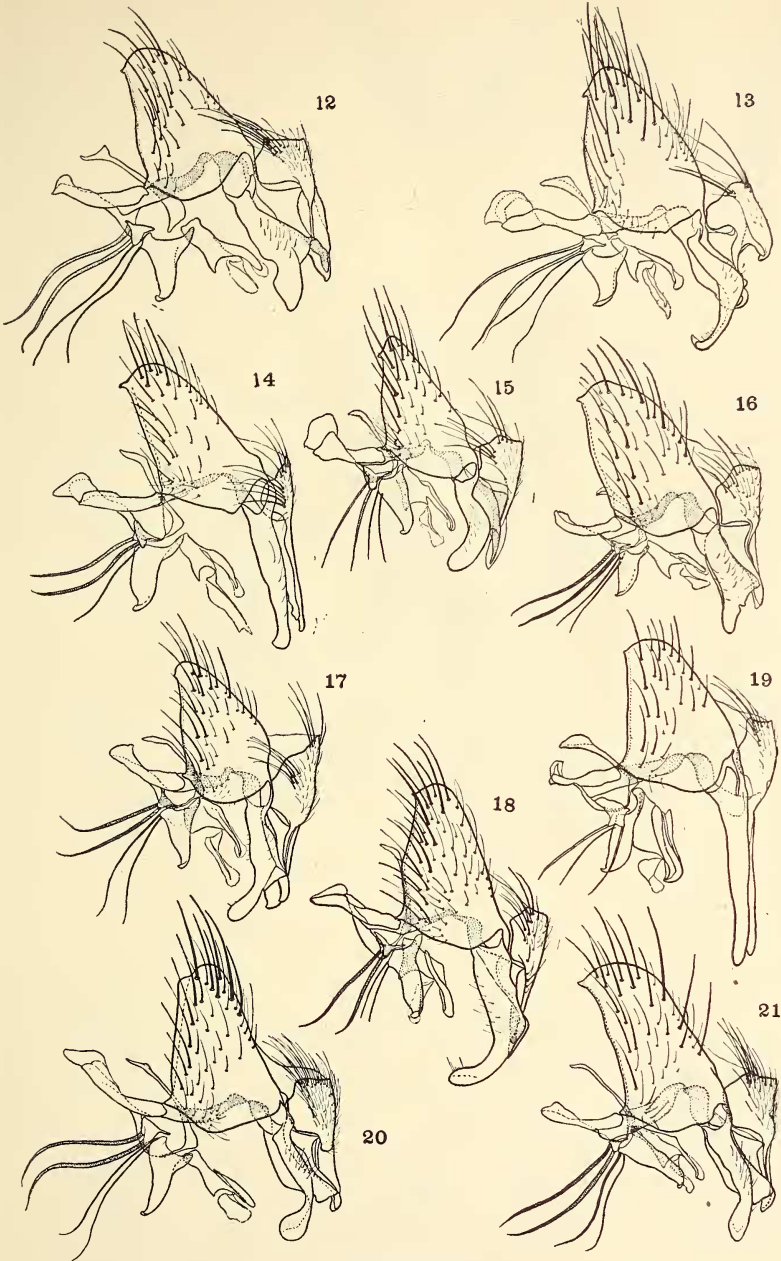


HYLEMYIA

PLATE II

Lateral aspect of male copulatory appendages

- Figure 12. *H. (Botanophila) subspinata* new species.
Figure 13. *H. (Botanophila) trifurcata* new species.
Figure 14. *H. (Botanophila) spinidens* (Malloch).
Figure 15. *H. (Botanophila) varicolor* (Meigen).
Figure 16. *H. (Botanophila) marginella* (Malloch).
Figure 17. *H. (Botanophila) acuticauda* new species.
Figure 18. *H. (Botanophila) piloseta* (Malloch).
Figure 19. *H. (Botanophila) fibulans* new species.
Figure 20. *H. (Botanophila) marginata* (Stein).
Figure 21. *H. (Botanophila) setigera* (Johannsen).



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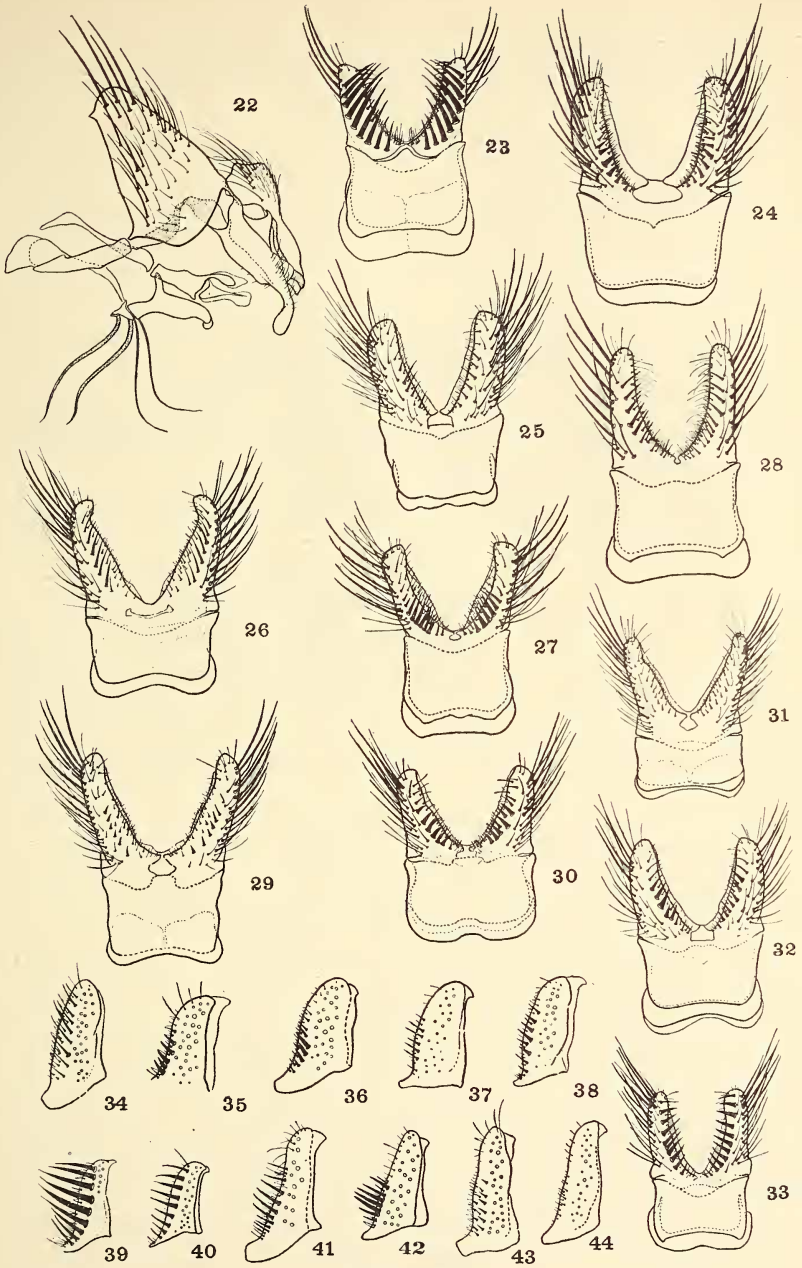
PLATE III

Lateral aspect of male copulatory appendages

Figure 22. *H. (Botanophila) spiniventris* (Coquillett).

Ventral aspect of fifth abdominal sternum in male, and lateral view
of processes with bristles removed

- Figures 23, 39. *H. (Botanophila) spiniventris* (Coquillett).
Figures 24, 36. *H. (Botanophila) piloseta* (Malloch).
Figures 25, 37. *H. (Botanophila) varicolor* (Meigen).
Figures 26, 34. *H. (Botanophila) fibulans* new species.
Figures 27, 42. *H. (Botanophila) spinidens* (Malloch).
Figures 28, 41. *H. (Botanophila) marginata* (Stein).
Figures 29, 43. *H. (Botanophila) setigera* (Johannsen).
Figures 30, 35. *H. (Botanophila) trifurcata* new species.
Figures 31, 44. *H. (Botanophila) marginella* (Malloch).
Figures 32, 38. *H. (Botanophila) acuticauda* new species.
Figures 33, 40. *H. (Botanophila) subspinata* new species.



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